

## EXTENDED MEASUREMENTS AND AN EXPERIMENTAL ACCURACY EFFECTIVE HAMILTONIAN MODEL FOR THE $3\nu_2$ AND $\nu_2 + \nu_4$ STATES OF AMMONIA

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The infrared spectrum of ammonia has proven to be highly problematic for effective Hamiltonian analysis. As a result, previous studies failed to model the  $3\nu_2$  and  $\nu_2 + \nu_4$  bands of the spectrum close to experimental accuracy. To remedy this a global fit of the  $3\nu_2$  and  $\nu_2 + \nu_4$  bands has been undertaken using SPFIT. The analysis includes about 1000 newly assigned vibrational transitions in  $3\nu_2$  to  $2\nu_2$  as well as inversion transitions in  $3\nu_2$  to  $3\nu_2$ . The spectra were a long path infrared absorption spectrum recorded with the Synchrotron light source at SOLEIL, with a path length of 180 m and a resolution of  $0.0011\text{ cm}^{-1}$  at room temperature and 1 Torr of pressure, and a mid-infrared discharge spectrum recorded similarly at SOLEIL, with a path length of 0.7 m and resolution  $.004\text{ cm}^{-1}$  at 10 Torr and 900 K. Our fit has achieved experimental accuracy through the use of a number of terms that had not previously been in the Hamiltonian proving that ammonia is tractable to effective Hamiltonians despite previous beliefs.